

FIGURE 1

BIT	FUNCTION	DESCRIPTION
15-0	PTI	PORT TAG INDEX.
19-16	EQoS	EGRESS QUEUE SELECT.
23-20	LAI	LAI INDEX.
24	JUMBO	EGRESS JUMBO CHECK FLAG.
25	DON'T FRAG	DON'T FRAGMENT FLAG.
26	IF TYPE	INGRESS INTERFACE TYPE. 0 = ETHERNET, 1 = POS INTERFACE.
27	-	RESERVED.
28	ROUTE	ROUTE FLAG.
29	RED	RANDOM EARLY DROP.
31-30	CTL	AFH FORMAT TYPE.
51-32	TXMI	TRANSMIT MODIFICATION INDEX.
58-52	CQoS	CPU QUEUE SELECT.
59	CPU COPY	CPU COPY FLAG.
60	REDIRECT	REDIRECT FLAG.
61	SSAMPLE	STATISTICAL SAMPLE FLAG.
62	LEARN	LEARN FLAG. REQUESTS OT TO SEND A COPY OF THE PACKET TO THE CPU FOR LEARN PROCESSING.
63	EMIRROR	EGRESS MIRROR.
75-64	IQoS	INGRESS QUEUE SELECT.
78-76	EMRK SEL	EGRESS MARK SELECT.
81-79	EMRK MASK	EGRESS MARK MASK.
82	IMIRROR	INGRESS MIRROR.
83	PERR KILL	PARITY ERROR KILL.

FIGURE 2

200

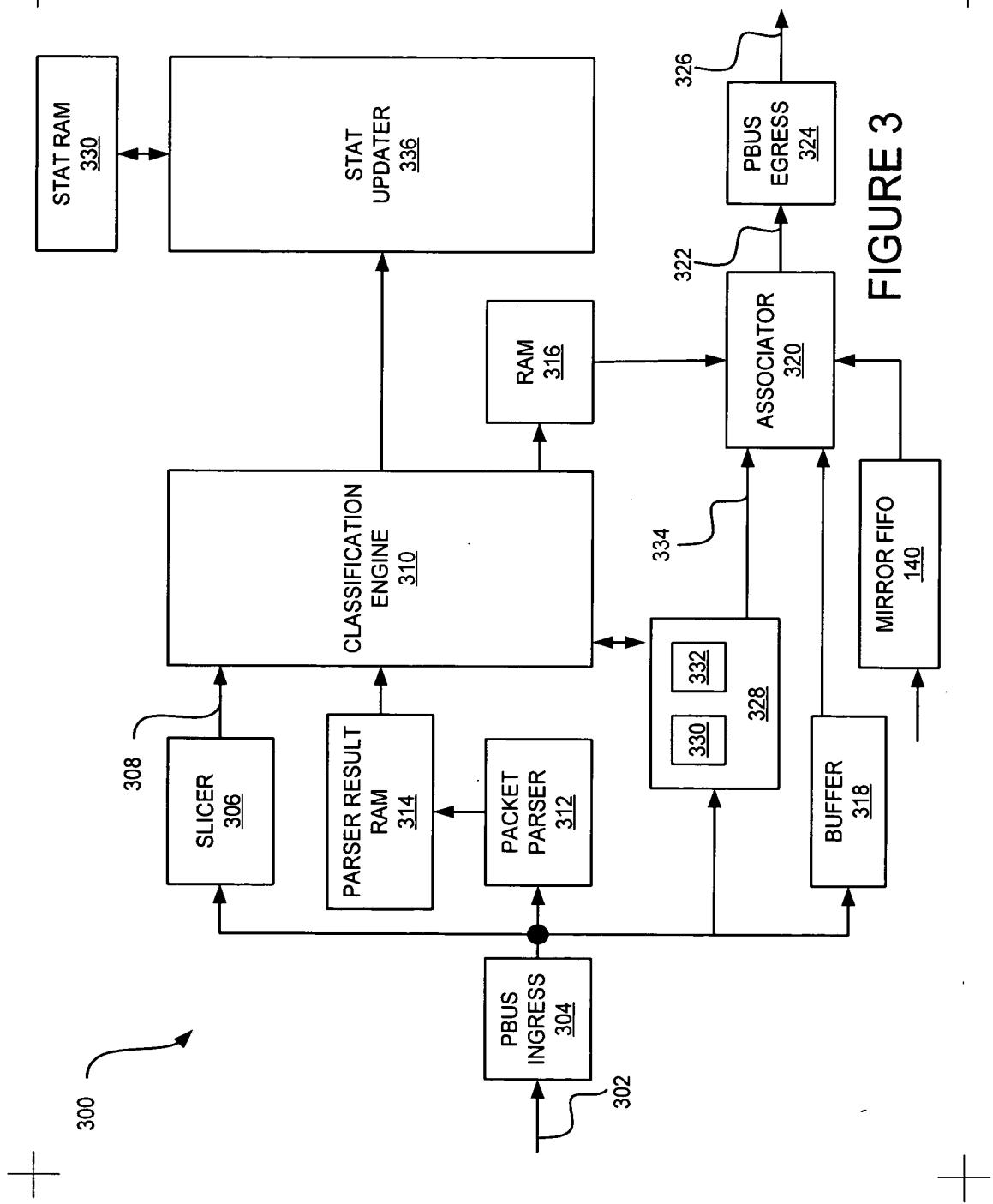


FIGURE 3

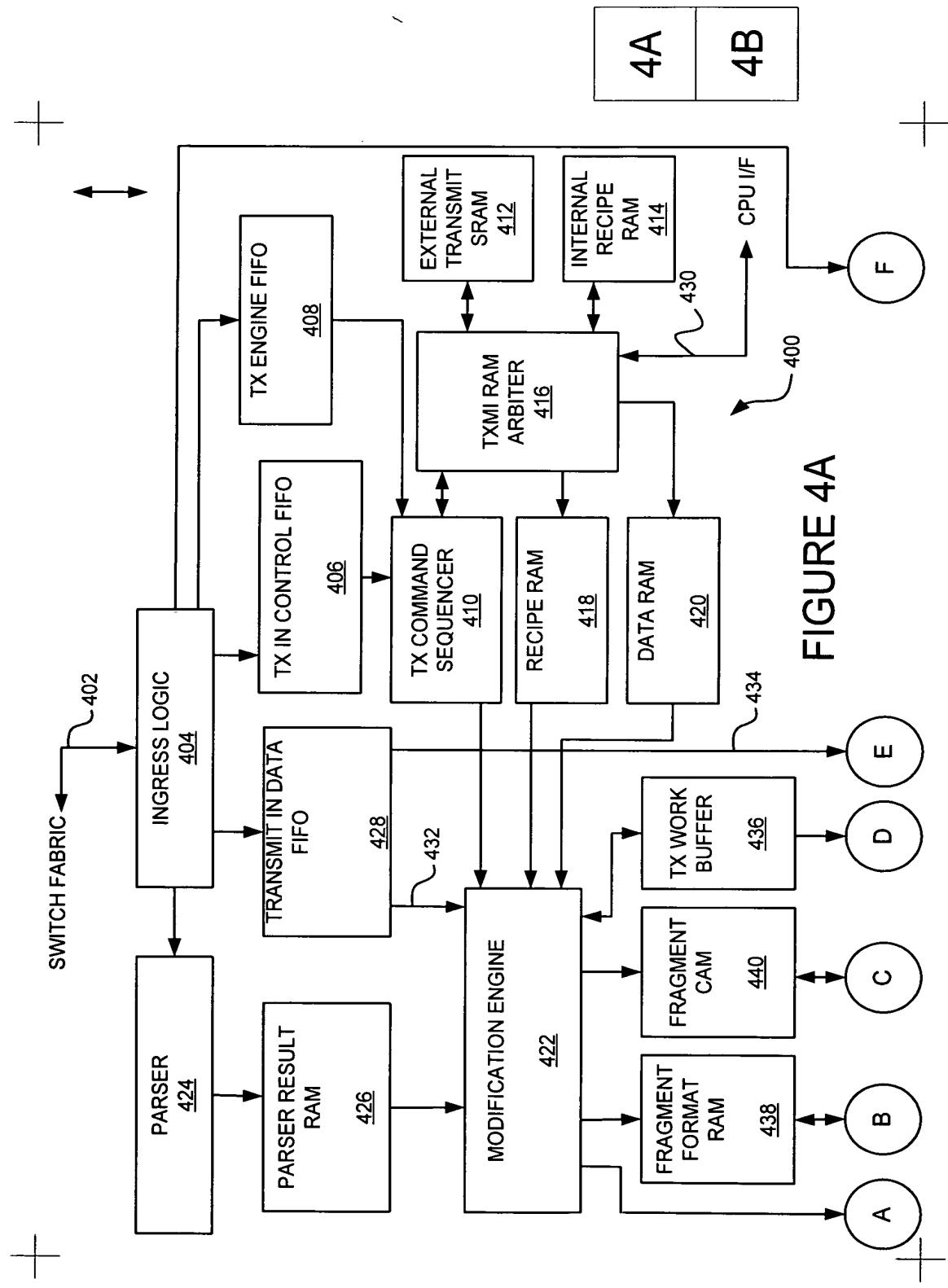
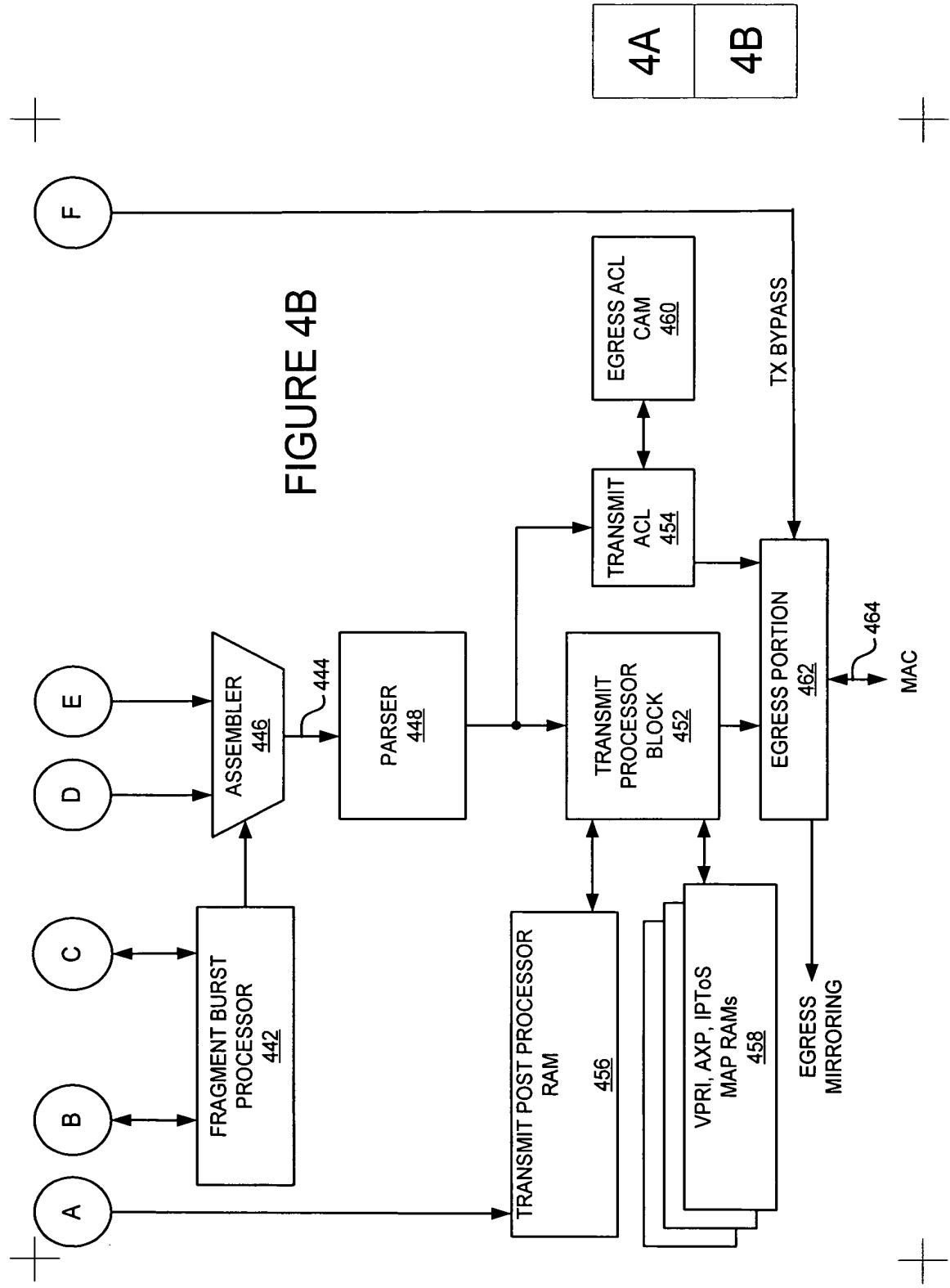


FIGURE 4A

FIGURE 4B



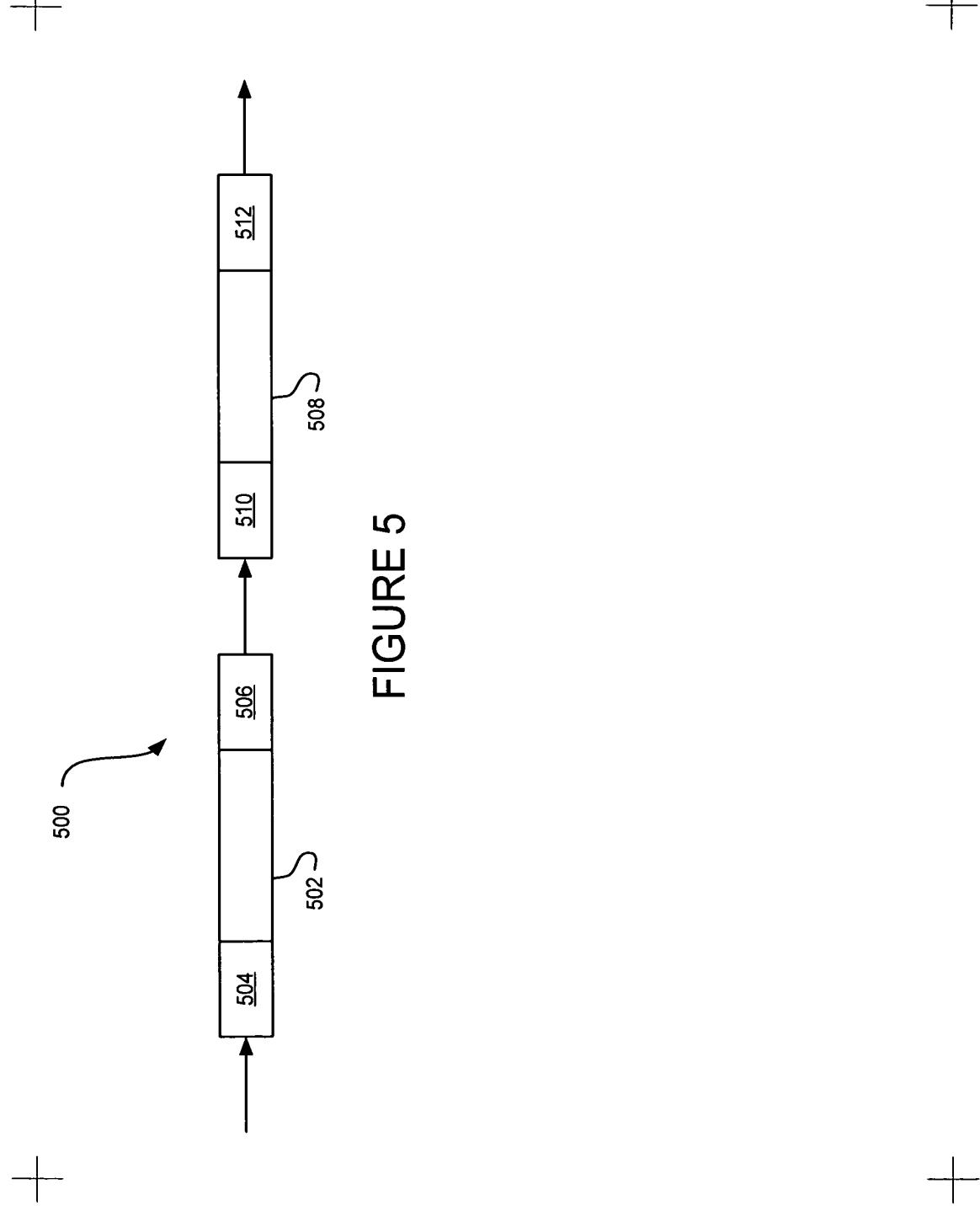


FIGURE 5

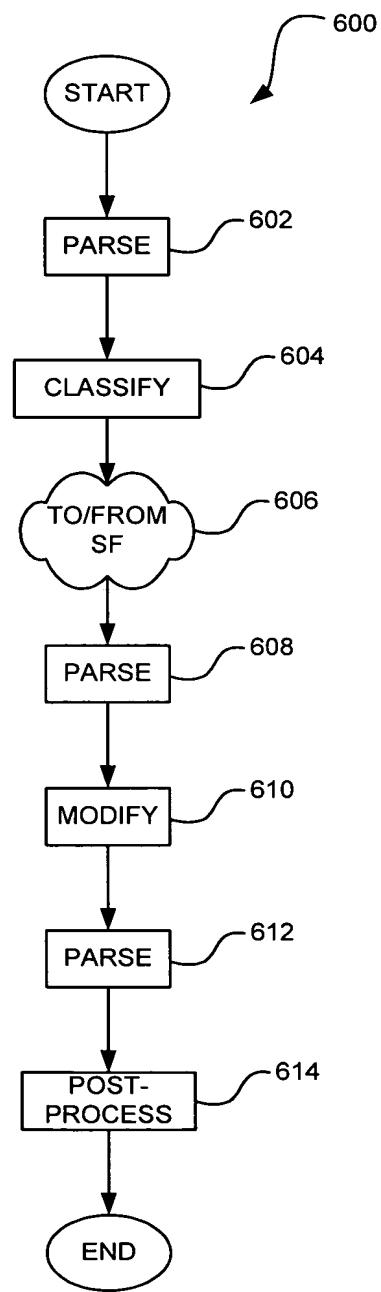


FIGURE 6

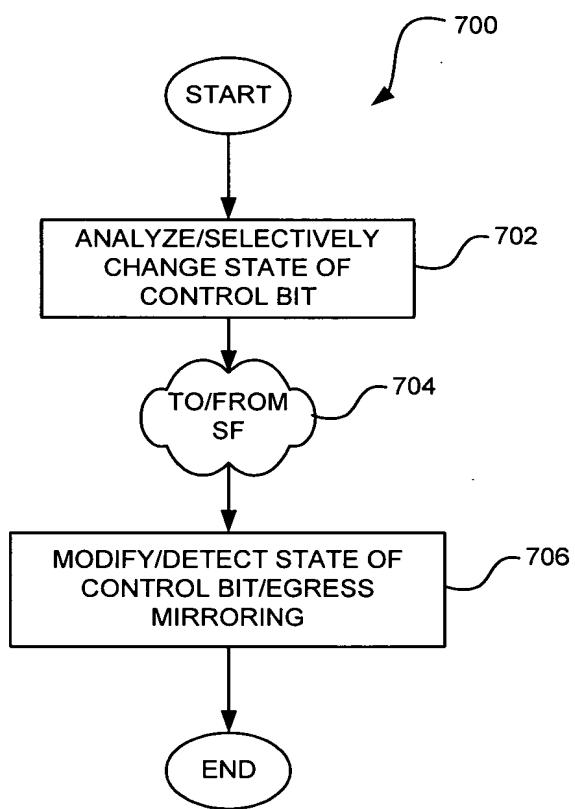


FIGURE 7

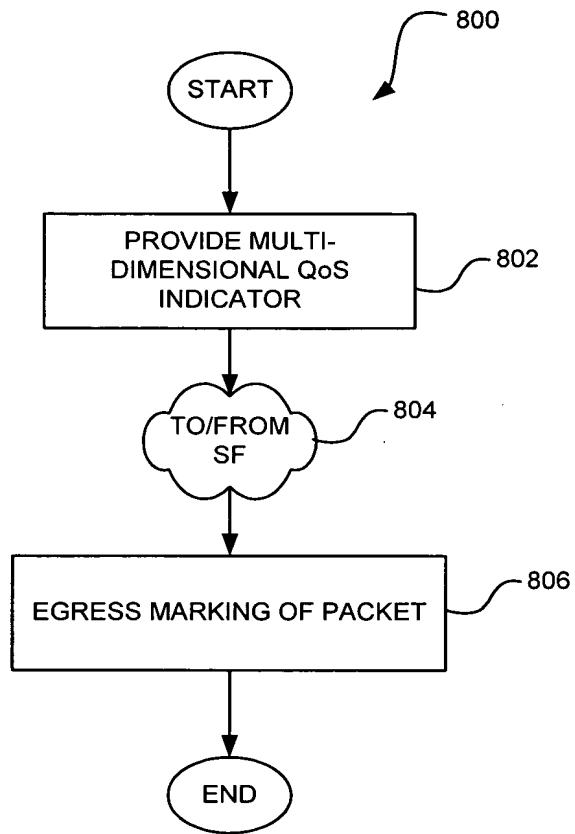


FIGURE 8

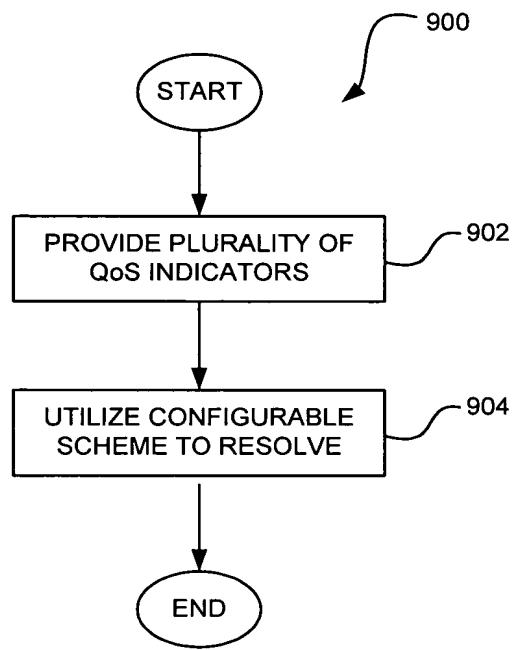


FIGURE 9

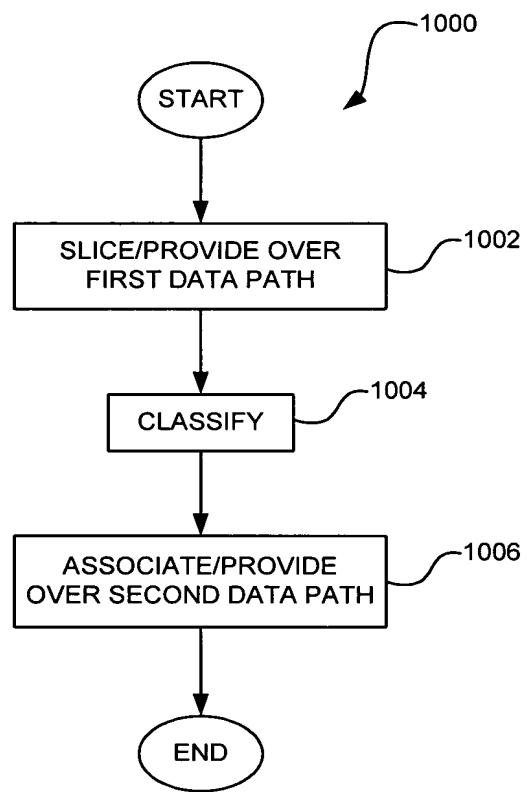


FIGURE 10

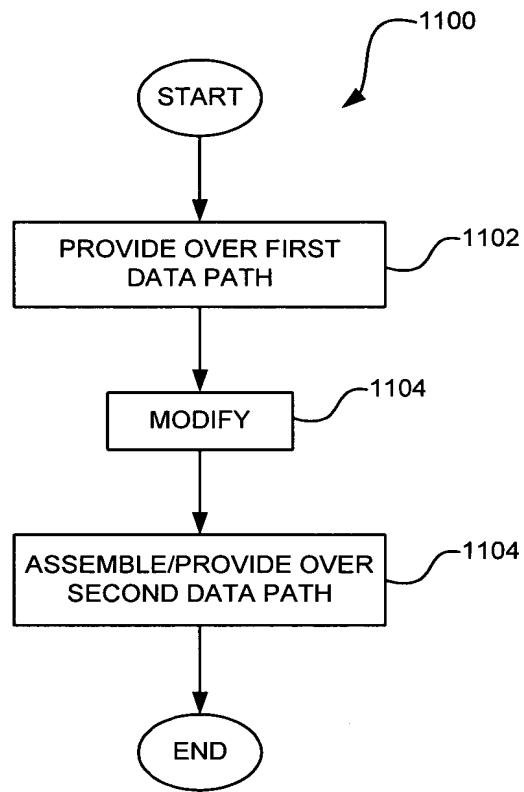


FIGURE 11

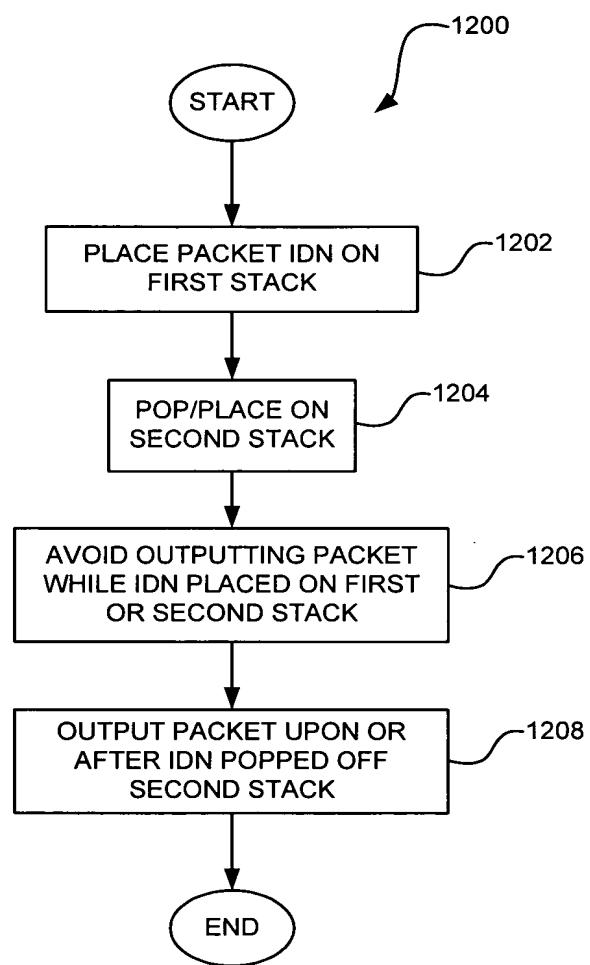


FIGURE 12

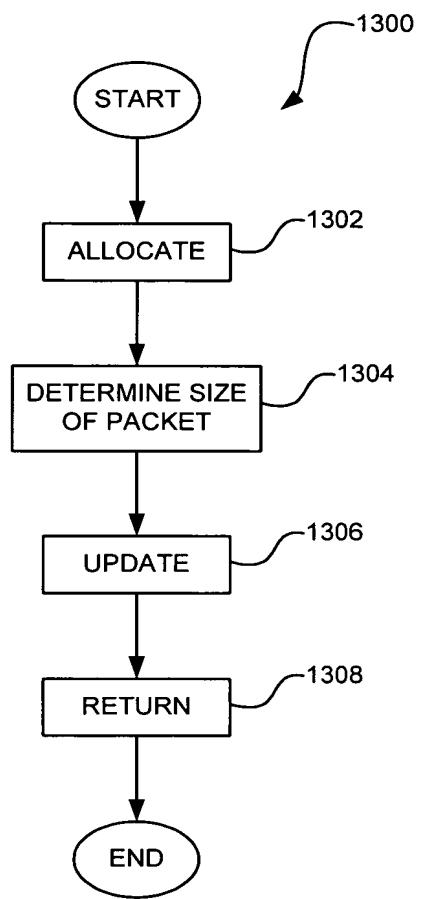


FIGURE 13

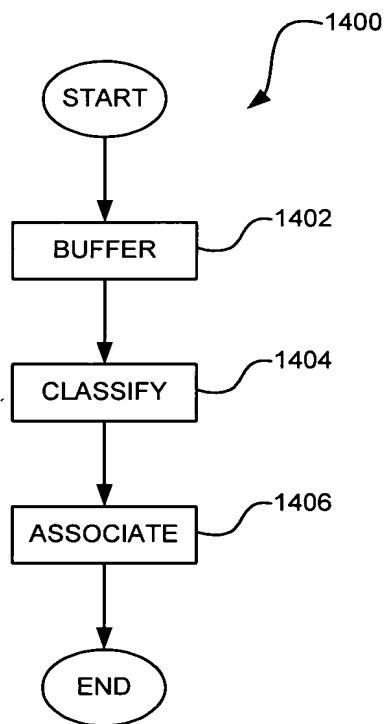


FIGURE 14

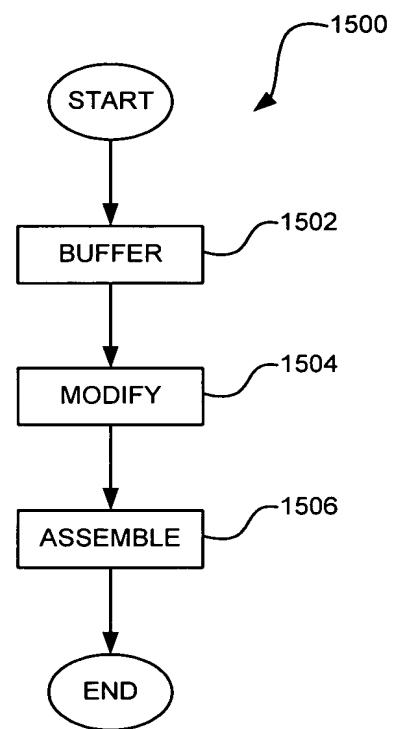


FIGURE 15

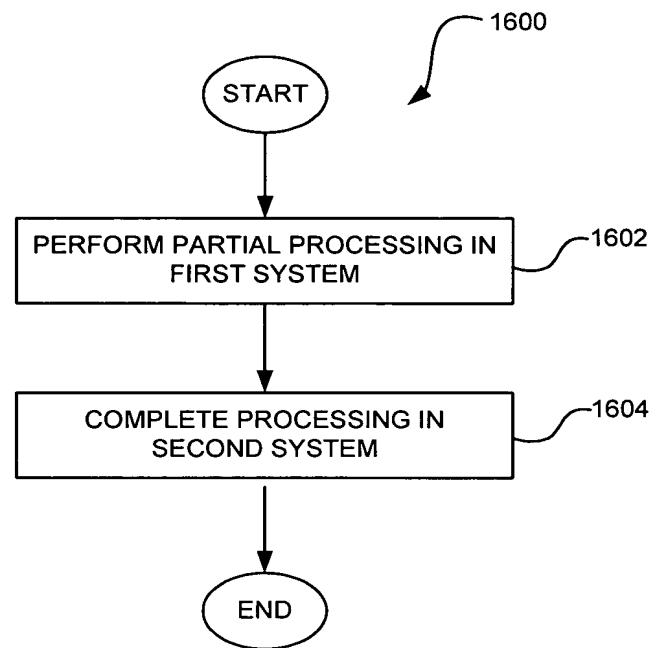


FIGURE 16

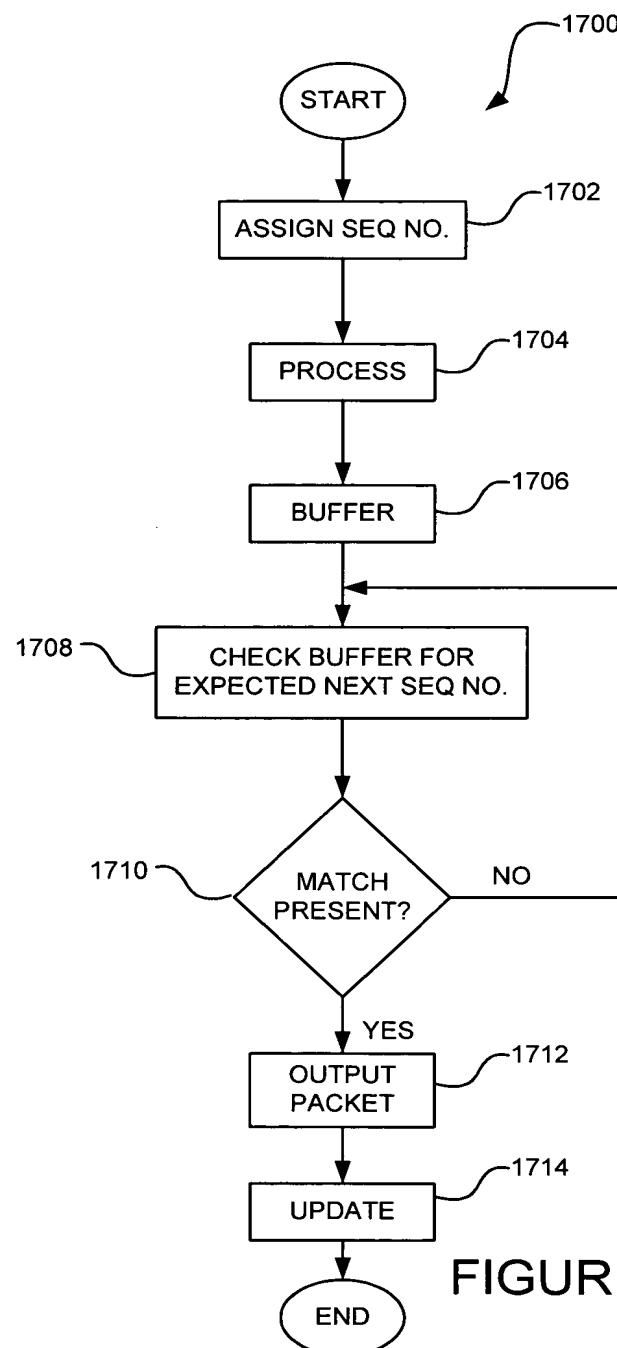


FIGURE 17

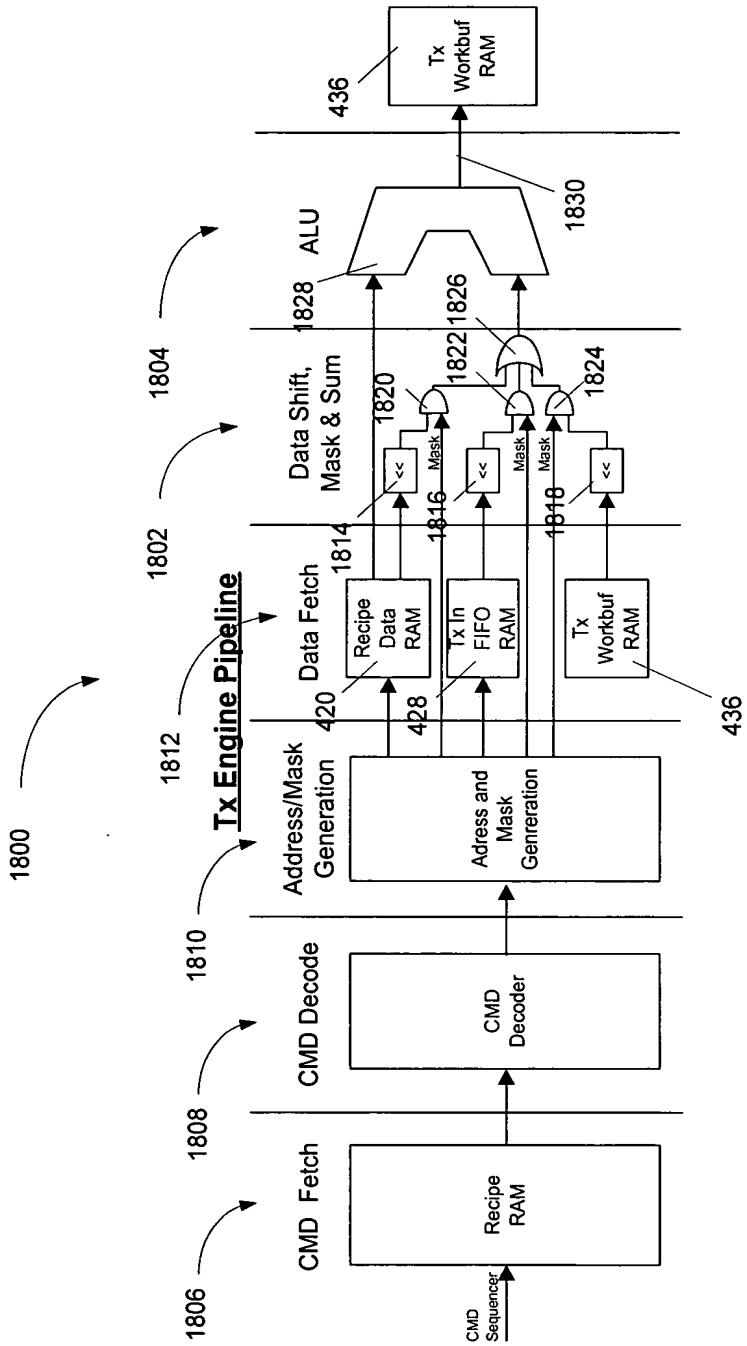


FIGURE 18

1900



10.4.1.1. External Link Entry Format

<i>Bit</i>	<i>Function</i>	<i>Description</i>
17-0	BURST ADDR 0	Burst Address 0.
21-18	BURST LEN 0	Burst Length 0.
41-32	BURST ADDR 1	Burst Address 1.
45-42	BURST LEN 1	Burst Length 1.
43-44	BURST ADDR 2	Burst Address 2.
47-46	BURST LEN 2	Burst Length 2.
70	INITEXT	Initialize External
71	PR	Empty Init Set by Init Vector and Party Address 0 to Recipient IDU.

FIGURE 19

FIGURE 20

10.4.1.2 Internal Link Entry Format

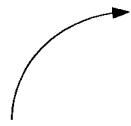
Bit	Description	Description
26-0	FIRST ADDR 1	First Address 1.
25-21	FIRST LEN 1	First Length 1.
46-26	FIRST ADDR 2	First Address 2.
31-27	FIRST LEN 2	First Length 2.
62-32	INT RECIPE INDEX	Internal Recipe Index.
67-63	INT RECIPE LEN	Internal Recipe Length.
62-68	-	Reserved
70	INVENT	Inventor External.
71	PAR	Parity Bit. Set so that there is odd parity across bits 7-10 of the entry data.

2000
→

FIGURE 21A

<i>Bit</i>	<i>Function</i>	<i>Description</i>
31-4	DATA 0	Data Segment 0.
35-32	DATA LEN	Data Length.
37-35	DATA 1	Data Segment 1.
30-28	-	Reserve.
7-1	WR	Write Bit. Set so that write is valid for current data.

2100



10.4.1.4. Data Entry Format

FIGURE 21B

XMT Data/Mask Format Mode No. 01008 XMT FORM						
Serial#	Reserve170:68	Mask2 (87:80)	Data2 (59:44)	Data1 (43:36)	Length30	Mask13 (1:16)
Serial#	Reserve170:68	Unused0 (67:36)		Length34	Unused0 (3:15)	Mask27:0
Serial#	Reserve170:68					

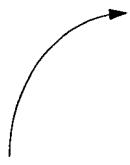
FIGURE 22

Intrinsic Feature PCA Loadings			
PC1	PC2	PC3	PC4
171	170	169.36	155.34
200	Command (n+1) weight	Command (n+1)	Assessed
			Command (n)

FIGURE 23

XDR Command Format							
[33:29]	[28]	[27:25]	[24:16]	[11:4]	[13:7]	[5]	[5:0]
Opcode	Page	Con2	Offset2	Page	Con1	Offset1	MSB[5] CWD Length
		Source Address			Destination Address		

2400



Context	Context Name	Location
C0	NULL	The very first byte of the packet including AFH
C1	L2	The start of the MAC header
C2	Ethertype	The start of the EtherType field (if present)
C3	MPLS	The start of the MPLS header(s) (if present)
C4	L3 Outer	The start of the outer L3 header
C5	L3 Inner	The start of the inner L3 header
C6	L4	The start of the TCP/UDP/RTP Header

FIGURE 24

FIGURE 25

Opcode	Command Mnemonic	Control Information	Data Fields
00000	TXM_CMD_NOP	-	-
00001	TXM_CMD_INSERT	Offset, Length	Insertion Data
00010	TXM_CMD_DELETE	Offset, Length	-
00011	TXM_CMD_REPLACE	Offset, Length	Replacement Data
00100	TXM_CMD_REPLACE_MASK	Offset, Length	Replacement Data/Mask
00101	TXM_CMD_COPY	Offset Source, Offset Destination, Length	-
00110	TXM_CMD_COPY_MASK	Offset Source, Offset Destination, Length	Copy Mask
00111	TXM_CMD_COPY_INS	Offset Source, Offset Destination, Length	-
01000	TXM_CMD_COPY_INS_MASK	Offset Source, Offset Destination, Length	Copy Mask
01001	TXM_CMD_MACRO1	VDEL, NICAST Flags, MAC DA, MAC SA, VLAN SA	MAC DA, MAC SA
01010	TXM_CMD_MACRO2	VDEL, NICAST Flags, MAC DA, MAC SA, VLAN SA	MAC DA, MAC SA
01011.	RESERVED	-	-
01100	TXM_CMD_ACL	Index, VPORT	-
01110	TXM_CMD_EMIC_VPRI	VPRI-EXP EMC fields	-
01111	TXM_CMD_EMIC_IPROS	IPROS EMC fields	-
10000	TXM_CMD_INCREMENT_INSERT	Offset, Length	-
10001	TXM_CMD_INCREMENT_REPLACE	Offset, Length	-
10010	TXM_CMD_DECREMENT	Offset, Length	-
10011	TXM_CMD_AND	Offset, Length	ALU Data
10100	TXM_CMD_OR	Offset, Length	ALU Data
10101	TXM_CMD_XOR	Offset, Length	ALU Data
10110	TXM_CMD_ADD	Offset, Length	ALU Data
10111	TXM_CMD_SUB	Offset, Length	ALU Data
11000	TXM_TTL_DECREMENT	MCAST/BCAST Flags	TTL decrement limit registers
11001	TXM_TC_INCREMENT	-	TC limit register
11010	TXM_TTL_DECREMENT_INS	MCAST/BCAST Flags	TTL decrement limit registers
11011	TXM_TC_INCREMENT_INS	-	TC limit register
11100-	Reserved	-	-
11111		-	-

```

txmi_cmd_replace_da          (Context: L2, Offset: 0, Length 6)
txmi_cmd_data                MAC DA (6 bytes external)
OPT1: txmi_cmd_replace      (Context: L2, Offset: 6, Length 6)
txmi_data                     MAC SA (6 bytes external)
OPT2: txmi_cmd_replace_sa   (Context: L2, Offset: 6, Length 6)
txmi_data                     Internal SA Pointer
OPT3: txmi_cmd_vlan_delete_replace
txmi_data                     (Context: L2, Offset: 14, Length 2)
                           VLAN (2 bytes external)

```

OPT1: If configuration register flag (use_interal_mac_sa) is set to 0 then the MAC SA will be read from the external TXM RAM.

OPT2: If configuration register flag (use_interal_mac_sa) is set to 1 then the MAC SA data will come from the internal register in the source field of the command (0 - 15).

OPT3: If the vDEL flag is set to 1 the VLAN field will be deleted else the VLAN field will be replaced with external TXM data.

FIGURE 26

	txni_cmd_replace_da txni_cmd_data	(Context: L2, Offset: 0, Length: 6) MAC DA (6 bytes external)
OPT1:	txni_cmd_replace txni_data	(Context: L2, Offset: 6, Length: 6) MAC SA (6 bytes external)
OPT2:	txni_cmd_replace_sa txni_data	(Context: L2, Offset: 6, Length: 6) Internal SA Pointer
OPT3:	txni_cmd_vlan_delete	(Context: L2, Offset: 14, Length: 2)
OPT1:	If configuration register flag (use_inteval_mac_sa) is set to 0 then the MAC SA will be read from the external TXM RAM.	
OPT2:	If configuration register flag (use_inteval_mac_sa) is set to 1 then the MAC SA data will come from the internal register in the source field of the command (0 – 15).	
OPT3:	If the VDEL flag is set to 1 the VLAN field will be deleted else the txni_cmd_vlan_delete command will be converted to a txni_cmd_nop command.	

FIGURE 27

```
if broadcast IP packets
    if (TTL>IPbroadcast_TTL_Limit[sub_channel])
        Decrement_TTL
        continue with next operation
    else
        Drop the packet
else if multicast IP packets
    if (TTL>IPmulticast_TTL_Limit[sub_channel])
        Decrement_TTL
        continue with next operation
    else
        Drop the packet
else // Must be unicast IP packets
    if (TTL>IPunicast_TTL_Limit[sub_channel])
        Decrement_TTL
        continue with next operation
    else
        Drop the packet
```

FIGURE 28

```
if (TCE_TC_Limit[sub_channel])  
    Increment TTR  
else  
    continue with next operation  
    Drop the packet
```

FIGURE 29

FIGURE 30

IXAT Command Format for the IX ACL Block			
[33.29]	[28.20]	[19.4]	[3.0]
Opcode	Reserved	VPOH4	Index

FIGURE 31

Txn Command Format for the Tx Processor Block			
13329	12048	1711	Reserved
Opcode	VPR1-EXP / PPOS-EVC Command		

Error Flag	Error Description	Action
0	ALU & Copy commands > packet size	Flag packet to be killed
1	Destination address is ahead of current read pointer	Flag packet to be killed
2	ALU & Copy commands > packet size	Flag packet to be killed
3	Reserved Opcode detected in the pipeline	Flag packet to be killed
4	Context1 < ContextId	Flag packet to be killed
6	Context2 < Context1	Flag packet to be killed
7	Context3 < Context2	Flag packet to be killed
8	Context4 < Context3	Flag packet to be killed
9	Context5 < Context4	Flag packet to be killed
10	Context6 < Context5	Flag packet to be killed
11	TTL < limit or TC > limit	Flag packet to be killed
12	TXM IN DATA_RAM Parity Error	Flag packet to be killed
13	Tx Workbuf Parity Error	Flag packet to be killed
14	TRAM or Internal Recipe RAM Parity Error	Flag packet to be killed
15	Packet modification > 0x80	Flag packet to be killed

FIGURE 32

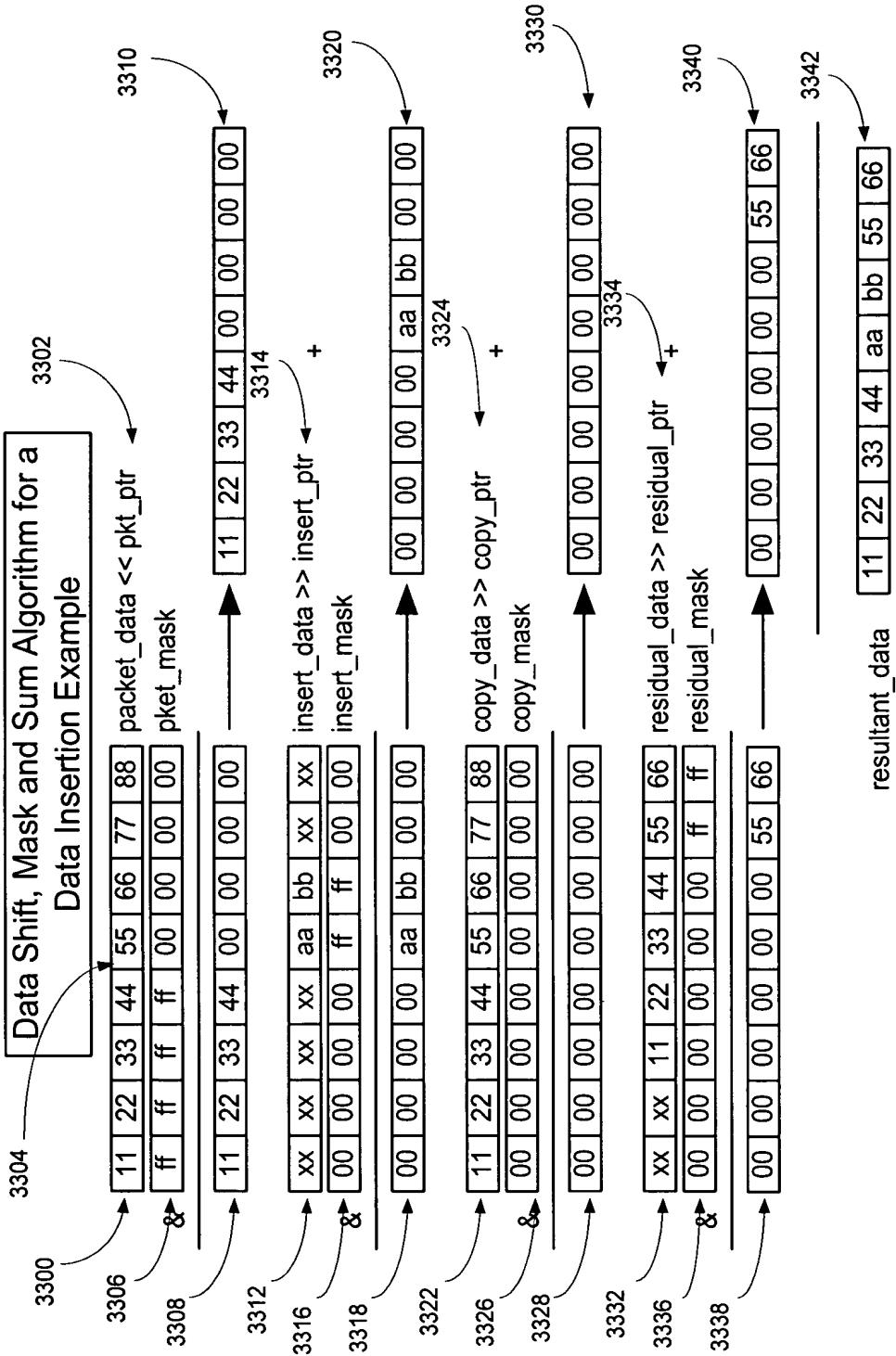


FIGURE 33

FIGURE 34

Sample Transmit Modification Recipe for a MAC Header Operation

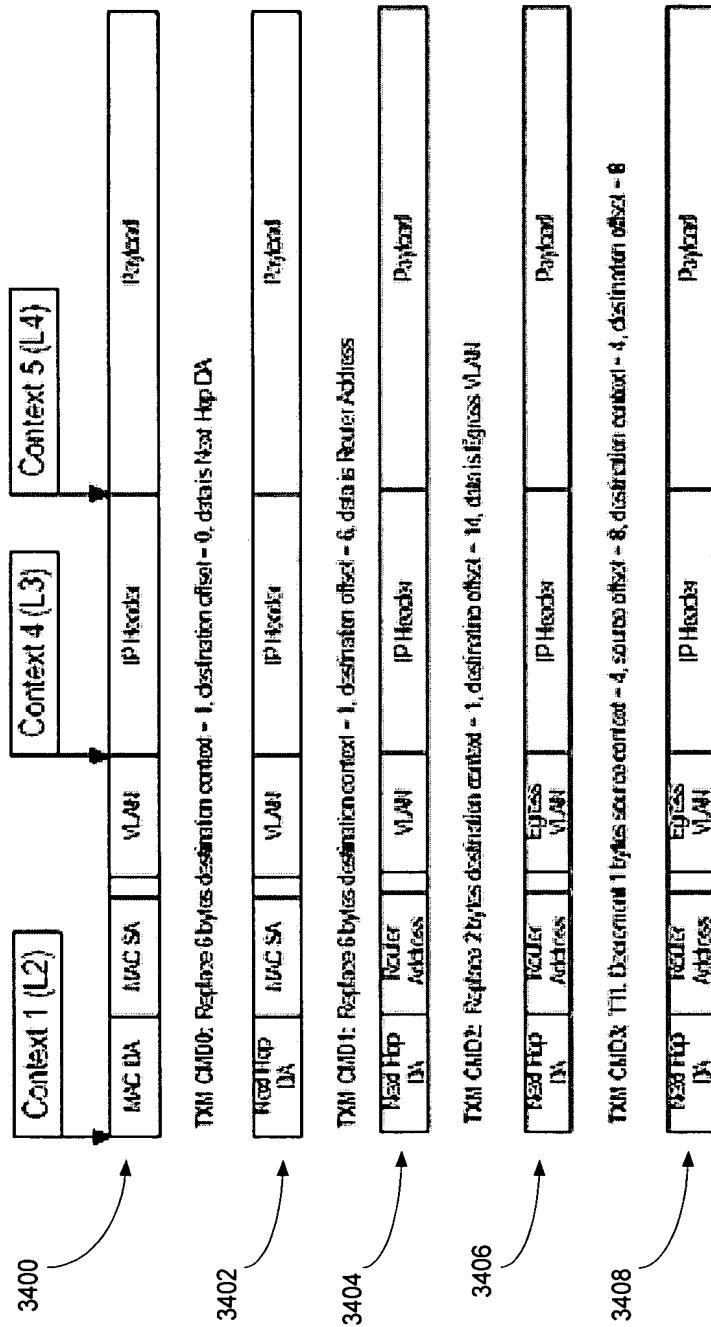


FIGURE 35

Forwarding Process Operation	Modification Type	Size (Bytes)	Packet Offset(s)
Next Hop MAC DA Replacement	Replace	6	0 (MAC)
Next Hop VLAN ID Replacement	Masked Replace	2	12 (MAC)
Source Address Insertion	Replace	6	6 (MAC)
TTL Decrement IPv4	Decrement	1	8 (NETWORK)
MPLS Stack Single Entry Add/Delete	Insert / Delete	4	0 (MPLS)
MPLS Stack Double Entry Add/Delete	Insert / Delete	8	0 (MPLS)
MPLS Label Change	Replace (could be masked to preserve CoS bits)	4	0 (MPLS)
MPLS TTL Decrement	Decrement	1	3 (MPLS)
MPLS TTL Copy	Copy	1	2 (MPLS) to 8 (NETWORK)
MPLS EtherType Replace/Restore	Replace	2	0 (LLC)
IP v4 Encapsulate/De-Encapsulate	Insert / Delete	20	0 (NETWORK)

FIGURE 36

CMD Function	CMD #	TXM CMD MNEMONIC	Source Context	Source Offset	Destination Context	Destination Offset	Length
Replace MAC DA	1	TXM_CMD_REPLACE	--	--	L2	0	6
		TXM_CMD_DATA	--	--	--	--	6
Replace MAC SA	2	TXM_CMD_REPLACE	--	--	L2	6	6
		TXM_CMD_DATA	--	--	--	--	6
Replace WLAN ID	3	TXM_CMD_REPLACE	--	--	L2	6	6
		TXM_CMD_DATA	--	--	--	--	6
TTL Decrement IPv4	4	TXM_CMD_DECREMENT	L3	\$	L3	8	1

CMD Function	CMD #	TXM CMD MNEMONIC	Source Context	Source Offset	Destination Context	Destination Offset	Length
Replace MAC DA	1	TXM_CMD_REPLACE	--	--	L2	0	6
		TXM_CMD_DATA	--	--	-	-	6
Replace MAC SA	2	TXM_CMD_REPLACE	--	--	L2	6	6
		TXM_CMD_DATA	--	--	-	-	6
Replace VLAN ID	3	TXM_CMD_REPLACE	--	--	L2	14	2
		TXM_CMD_DATA	--	--	-	-	2
IPv4 Encap	4	TXM_CMD_INSERT	--	--	L3 Outer	0	7
		TXM_CMD_DATA	--	--	-	-	7
TTL Decrement	5	TXM_CMD_DECREMENT	L3 Outer	8	L3 Outer	0	1
		TXM_CMD_INSERT	--	--	L3 Outer	0	8
IPv4 Encap	6	TXM_CMD_INSERT	--	--	-	-	8
		TXM_CMD_DATA	--	--	-	-	8
IPv4 Encap	7	TXM_CMD_INSERT	--	--	L3 Outer	0	4
		TXM_CMD_DATA	--	--	-	-	4

FIGURE 37

CMD Function	CMD #	TXM_CMD_MNEUMONIC	Source Context	Source Offset	Destination Context	Destination Offset	Length
Replace MAC DA	1	TXM_CMD_REPLACE	-	--	L2	0	6
Replace MAC SA	2	TXM_CMD_DATA	-	--	--	-	6
Replace VLAN ID	3	TXM_CMD_REPLACE	-	--	L2	6	6
IPv4 de-encapsulate	4	TXM_CMD_DELETE	-	--	--	-	6
Decrement Inner TTL	5	TXM_TTL_DECREMENT	L3 Inner	8	L3 Inner	8	1

FIGURE 38

FIGURE 39

CMD Function	CMD #	TXM CMD MNEMONIC	Source Context	Source Offset	Destination Context	Destination Offset	Length
Replace MAC DA	1	TXM_CMD_REPLACE	--	--	L2	0	6
Replace MAC SA	2	TXM_CMD_REPLACE	--	--	L2	6	6
Replace VLAN ID	3	TXM_CMD_REPLACE	--	--	L2	14	2
Ipv6 Encap	4	TXM_CMD_INSERT	--	--	L3 Outer	0	7
TTL Decrement	5	TXM_CMD_DECREMENT	L3 \ INSERT	--	--	--	7
Ipv6 Encap	6	TXM_CMD_INSERT	--	--	L3 Outer	0	1
Ipv6 Encap	7	TXM_CMD_INSERT	--	--	L3 Outer	0	8
Ipv6 Encap	8	TXM_CMD_INSERT	--	--	L3 Outer	0	8
Ipv6 Encap	9	TXM_CMD_INSERT	--	--	L3 Outer	0	8
		TXM_CMD_DATA	--	--	--	--	8

CMD Function	CMD #	TXM CMD MNEMONIC	Source Context	Source Offset	Destination Context	Destination Offset	Length
Replace MAC DA	1	TXM_CMD_REPLACE	--	--	L2	0	6
		TXM_CMD_DATA	--	--	--	-	6
Replace MAC SA	2	TXM_CMD_REPLACE	--	--	L2	6	6
		TXM_CMD_DATA	--	--	--	-	6
Replace VLAN ID	3	TXM_CMD_REPLACE	--	--	L2	14	2
		TXM_CMD_DATA	--	--	--	-	2
IPv6 Encap	4	TXM_CMD_INSERT	--	--	L3_Outer	0	7
		TXM_CMD_DATA	--	--	--	-	7
TTL Decrement	5	TXM_CMD_DECREMENT	L3	--	--	-	
		INSERT Outer		8	L3_Outer	0	1
IPv6 Encap	6	TXM_CMD_INSERT	--	--	L3_Outer	0	8
		TXM_CMD_DATA	--	--	--	-	8
IPv6 Encap	7	TXM_CMD_INSERT	--	--	L3_Outer	0	8
		TXM_CMD_DATA	--	--	--	-	8
IPv6 Encap	8	TXM_CMD_INSERT	--	--	L3_Outer	0	8
		TXM_CMD_DATA	--	--	--	-	8
IPv6 Encap	9	TXM_CMD_INSERT	--	--	L3_Outer	0	8
		TXM_CMD_DATA	--	--	--	-	8

FIGURE 40

FIGURE 41

CMD Function	CMD #	TXML CMD MNEUMONIC	Source Context	Source Offset	Destination Context	Destination Offset	Length
Last Hop Route Address	1	TXML_CMD_COPY	L3	10	L2	0	6
Replace MAC SA	2	TXML_CMD_REPLACE	--	--	L2	6	6
Replace WLAN ID	3	TXML_CMD_REPLACE	--	--	L2	14	2
Increment TC	4	TXML_CMD_INCREMENT	L3	5	L3	5	1

FIGURE 42

CMD Function	CMD #	TXM_CMD_MNEUMONIC	Source Context	Source Offset	Destination Context	Destination Offset	Length
Replace MAC DA	1	TXM_CMD_REPLACE	--	--	L2	0	6
Replace MAC SA	2	TXM_CMD_REPLACE	--	--	--	--	6
Replace VLAN ID	3	TXM_CMD_REPLACE	--	--	L2	6	6
Replace EtherType	4	TXM_CMD_REPLACE	--	--	--	--	6
MPLS Label Insert	5	TXM_CMD_INSERT	--	--	L2	14	2
TTL Decrement	6	TXM_CMD_DECREMENT	L3	8	MPLS	3	1

CMD Function	CMD #	TXM CMD MNEMONIC	Source Context	Source Offset	Destination Context	Destination Offset	Length
Replace MAC DA	1	TXM_CMD_REPLACE	--	--	L2	0	6
Replace MAC SA	2	TXM_CMD_REPLACE	--	--	--	--	6
Replace VLAN ID	3	TXM_CMD_REPLACE	--	--	L2	6	6
Replace EtherType	4	TXM_CMD_REPLACE	--	--	--	--	6
MPLS Label Insert	5	TXM_CMD_INSERT	--	--	MPLS	0	3
TTL Decrement	6	TXM_CMD_DECREMENT	L3	\$	MPLS	3	1
MPLS Label Insert	7	TXM_CMD_INSERT	--	--	MPLS	4	3
TTL Decrement	8	TXM_CMD_DECREMENT	L3	\$	MPLS	7	1

FIGURE 43

FIGURE 44

CMD Function	CMD #	TXM CMD MNEMONIC	Source Context	Source Offset	Destination Context	Destination Offset	Length
Replace MAC DA	1	TXM_CMD_REPLACE	--	--	L2	0	6
Replace MAC SA	2	TXM_CMD_REPLACE	--	--	-	-	6
Replace VLAN ID	3	TXM_CMD_REPLACE	--	--	L2	6	6
MPLS Label Insert	4	TXM_CMD_INSERT	--	--	-	-	6
TTL Decrement	5	TXM_CMD_DECREMENT	L3	8	MPLS	3	1

CMD Function	CMD #	TXM CMD MNEMONIC	Source Context	Source Offset	Destination Context	Destination Offset	Length
Replace MAC DA	1	TXM_CMD_REPLACE	--	--	L2	0	6
Replace MAC SA	2	TXM_CMD_REPLACE	--	--	--	--	6
Replace WLAN ID	3	TXM_CMD_REPLACE	--	--	L2	6	6
TTL Decrement	4	TXM_CMD_DECREMENT	L3	8	L3	8	1
Replace IP DA or SA	5	TXM_CMD_REPLACE	L3	12/16	L3	12/16	4
Replace TCP/UDP Source or Dest port	5	TXM_CMD_REPLACE	L4	0/2	L4	0/2	2
		TXM_CMD_DATA	--	--	--	--	2

FIGURE 45

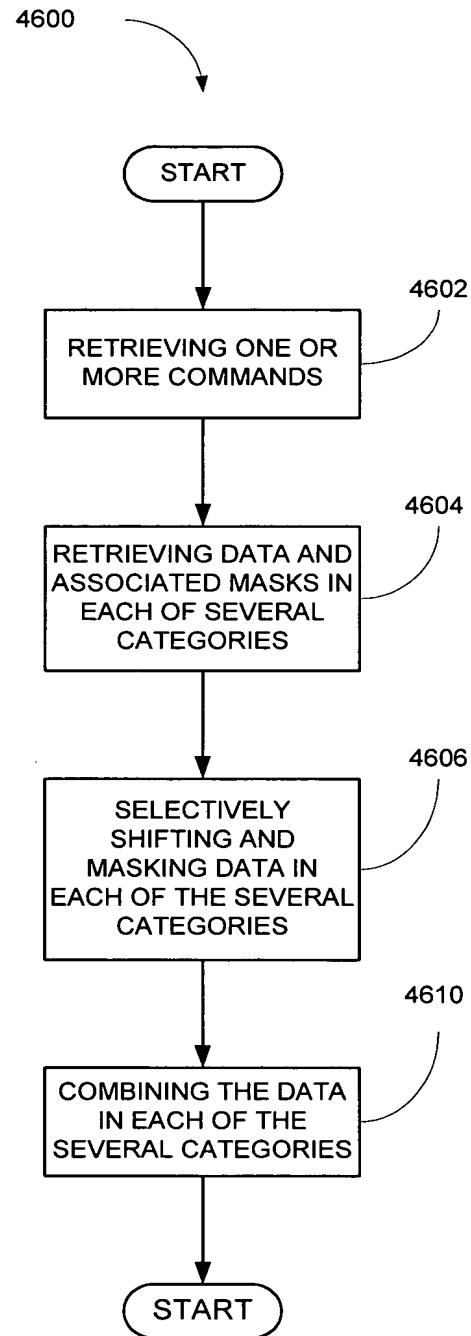
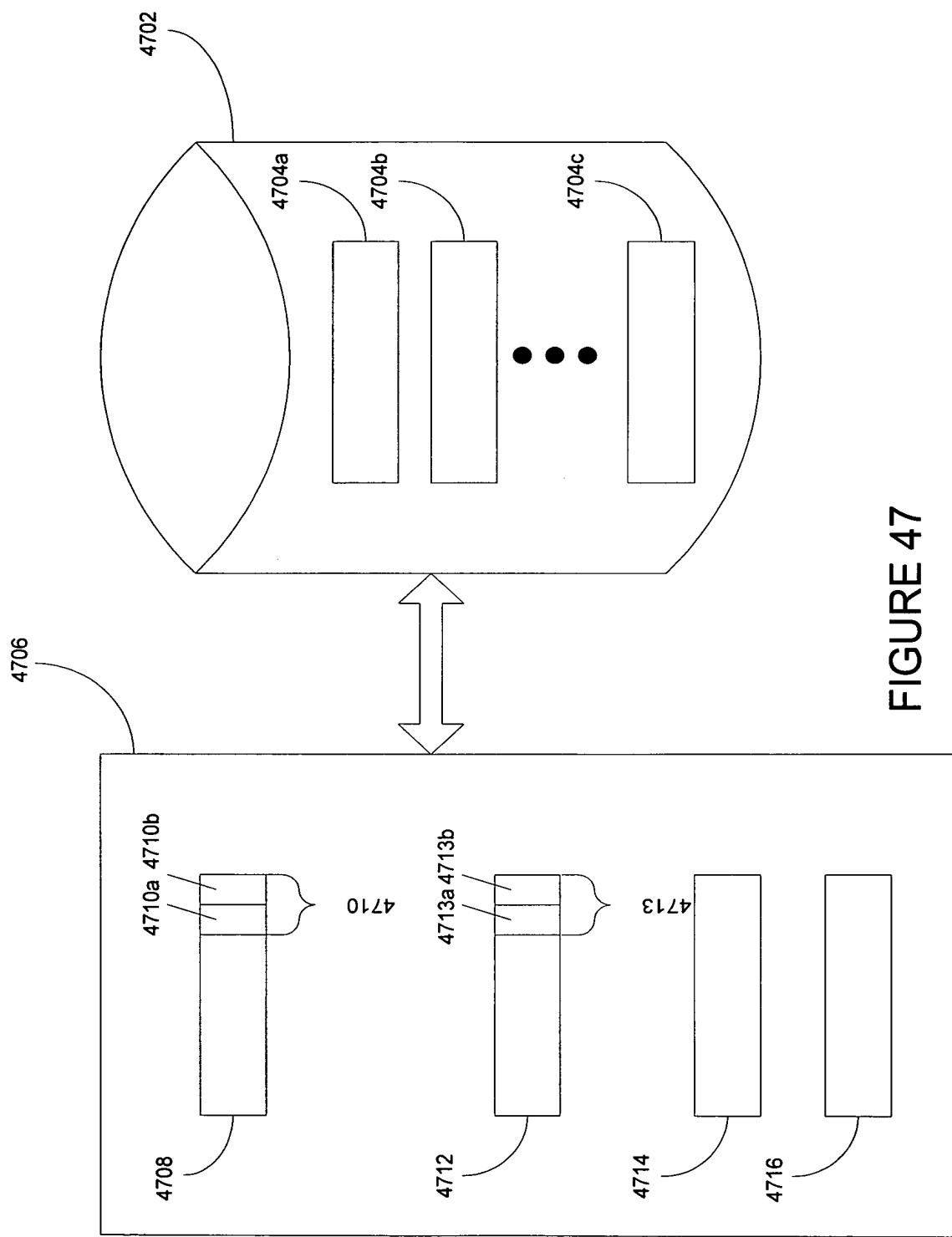


FIGURE 46

FIGURE 47



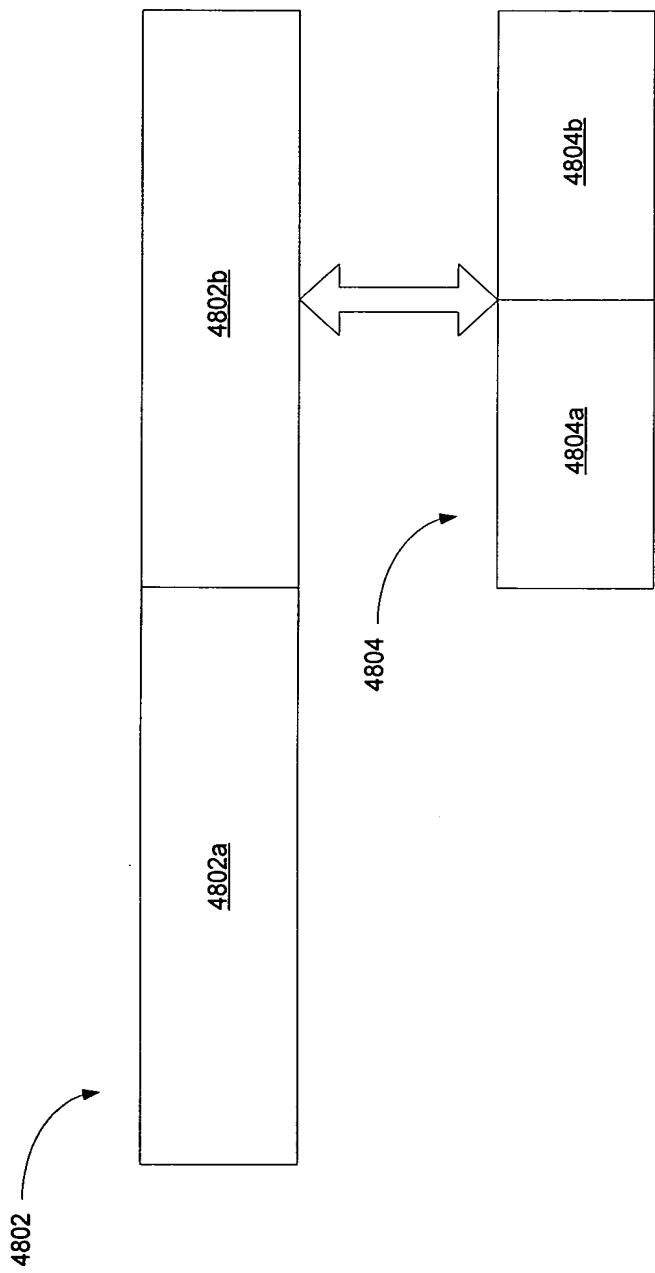


FIGURE 48